

Exploring Mystery Products to Develop Design and Technology Skills: Case Studies from the Design Museum's Outreach Project

Abstract

This article presents three case studies that illustrate the value to teachers and learners of using handling collections in design and technology. It briefly outlines an initiative by the Design Museum to create an Outreach Project to support teachers in this aspect of design and technology and then provides examples of classroom practise from a primary teacher, secondary teacher and from two teachers in an MLD special school.

The article illustrates how the approach to using handling collections for product analysis activities promotes enthusiastic responses in both teachers and learners and not only develops understandings of how products work, what they are made from and so on, but also develops a broader range of skills such as problem solving, observation and collaboration. It also highlights how literacy skills can be supported through such activities.

The case studies provide detail of classroom practice from three very different settings. Through the examples given other teachers will hopefully be encouraged and inspired to engage in similar activities in their own classrooms and workshops.

Introduction

In 1997 the Design Museum launched a project to support teachers in their use of handling collections and product analysis. To do this they put together a 'Mystery Loan Box' collection of items, an outreach in-service programme and then over the space of three years worked with 19 LEAs from across England and Wales to support teachers in their use of handling collections in design and technology lessons. Each LEA that participated was given a 'Mystery Box' collection for teachers to loan and was provided with an introductory INSET session for teachers and LEA personnel. Towards the end of the second year, the Museum commissioned Goldsmiths to undertake an evaluation of the impact of the Outreach Programme. In the course of the evaluation a collection of case studies were developed that illustrated what had happened to the boxes during the time the schools had loaned them and how teachers had built on the experience in the work they subsequently undertook in their classrooms.

The boxes were developed to be a 'mini museum on wheels' and each included a range of products that the children (let alone the teachers) were unlikely to have encountered and which had interesting, innovative or novel design stories behind them. Included in the

boxes were items such as the Phillippe Starck lemon juicer, Attila the Can Crusher and an Alessi cruet (see Figure 1). Teachers were given opportunities for hands on exploration of the items at in-service sessions with Gill Shaw, the Design Museum's trainer.

Three of these case studies are reported here. The three have been chosen to illustrate examples from primary, secondary and special education.

An early years teacher introducing the approach to a small rural primary school

The first case study outlines how a teacher who used the Mystery Loan Box in the first year of the Outreach Programme has since adapted the approach to use with 'mystery' handling collections of her own. The case study briefly outlines her work with the Design Museum's Mystery Box and then goes on to describe in some detail an activity with a vertically grouped Key Stage 1 class (ages from 4-7) who spent an afternoon investigating a collection of mystery tools. The original work was carried out in a suburban infant school. The new work took place after the teacher had moved to a small (two class) rural primary school.

How the handling collection was used

Following the Design Museum session, the teacher used the Box with her Year 2 class. The children worked in small groups, were encouraged to observe the object carefully and to use discussion and imagination to look for clues about what the product's purpose was. The teacher encouraged them to draw on their scientific knowledge of materials and how things work and also to make a carefully observed drawing. Undertaking the drawing encouraged the children to look at the detail of the object before them.

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Figure 1: Items included in the Mystery Box.

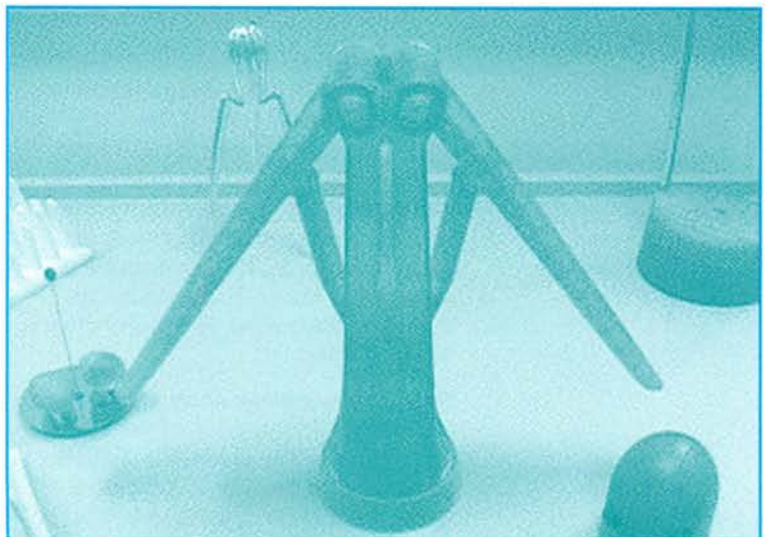




Figure 2: Children explore the Starck juicer.



Figure 3: The objects revealed.



Figure 4: Tom explores the feel of the pie funnel.

Commenting on this first set of activities, the teacher felt the children enjoyed the activity because it provided a very different experience to their normal day and it gave them an insight into innovative design. She also reported that all of the staff, while a little skeptical at first, were 'enthralled by the results of using the artefacts. It gave great opportunities for speaking and listening, developing observation skills and encouraged lateral thinking.'

Developments since using the Mystery Loan Box

After using the Box, the teacher moved to work in a small rural primary school. In this setting, she took the opportunity to build on

the investigative approach promoted by the Design Museum and to use it with her own handling collections. I visited the school on an afternoon when the teacher was engaging the children in just such an activity, using a collection of tools that included a garlic press, an electric fan, a modelling tool for working clay, a ceramic pie funnel, a chopstick holder, a ski sharpener, a tile cutter and a staple remover. She began the activity by talking to the children, explaining that they would be detectives and would have to look for clues to find out about the objects (each of which was in place at their tables, but covered over at this stage). As a class they discussed what they would be able to look for – the children suggested colour, shape, texture, size, materials used and so on. The process they were to go through involved them first looking without touching and then as a group deciding on one thing they could tell the rest of the class about their object. Next they could touch the object to see what else they could find out and again report this back to the whole class. Finally they were asked to make a careful labelled drawing of their object and write down what they thought it was. All of this work was undertaken in small groups with a strong emphasis on collaboration – one of their themes for the week. Group discussion and group decision making were emphasised, although children each made their own drawing. Finally the class came back together on the carpet and the mysteries were solved, as each object was discussed and its purpose revealed, sometimes by the children themselves, based on their 'detective' work, sometimes by the teacher.

This activity enabled the children to explore quite simple artefacts in a great deal of depth, with the tiniest of clues being identified and used to build a picture of the purpose of the object. Below, three examples of the outcomes of the work and the exploration that was undertaken are outlined.

The pie funnel

The ceramic pie funnel was explored by four reception aged children. They looked very carefully and reported back initially that it was shaped like a bell and had holes in it. When they were allowed to handle the object they found it to be smooth and Tom, one of the group who was 4 years-old at the time, said he thought it was made of clay and would break if it was dropped.

They then made their drawings. Tom's drawing is shown here. The speckles he has so carefully included are tiny colourations in the glaze – only visible on extremely close inspection!

While these reception children didn't solve the mystery themselves, the quality of their observation and their use of language was very impressive. They were also fully engaged in the activity throughout.

The fan

The fan the children were given to explore was one that plugged into a light bulb socket. The group who explored this object were a mixture of Year 1 and Year 2 children who were quick to pick up the features, spotting that it was made of metal and that it had a motor and a 'fan' shape.

Jonathan, a Year 1 child in the group, explored the fan extremely carefully and noticed also that it had a fitting for a light bulb socket. He showed all of these features on his drawing. Although he doesn't have the writing skills yet to fully annotate his drawing, his vocabulary was very impressive: he explained that 'the motor drives the propeller and it blows air'. When asked what 'drives' meant, he used the artefact to explain that it means 'turns'. Later in whole class discussion, he added that the power to drive the motor came from the light bulb socket.

Clay modelling tool

Three Year 2 children explored the clay modelling tool. They scoured every bit of it for clues, first looking, then touching and smelling! They reported to start with that it was shaped like a pencil, but they soon noted a whole range of features, such as the different shapes to each end, the wood section (which they said smelled of pine!), the wire that held the metal ends in place, the traces of clay embedded in the metal, the 'lines' in the wood, and so on. This detail is shown in Alice's drawing, in which she shows us both a 'sideways' view and a 'forwardways' view. She also tells us that she thinks its for making shapes in clay – the mystery is solved. This work shows the level of detail of observation that this type of activity can provoke in young children, and also what a rich source of language development it provides. For Alice, as a Year 2 child, she was building on skills the teacher had already focused for development.

The teacher's reflections

Looking back to her earlier experiences with the Mystery Box, the teacher thought that the resource had been terrific – both fun and developing children's interest in design. The concept of product evaluation wasn't new to her, but the approach taken showed a new way of achieving the teaching and learning involved. She particularly liked the detective approach as it made for an excellent link to develop children's literacy. In particular she



Figure 5: Tom's drawing of the pie funnel.

felt that it provided opportunities for children to focus their minds and organise their thoughts and their decisions and then to have the opportunity to verbalise these – first through talk and then through writing.

She considered that one of the biggest challenges was to get children to really look at something – her work in regard to this skill was evident when she said to the children 'draw what you see' and they immediately continued with 'not what you think you see'. The group work aspect also allowed her to develop children's collaborative skills as they had to make group decisions about what to



Figure 6: Jonathan's drawing of the fan.

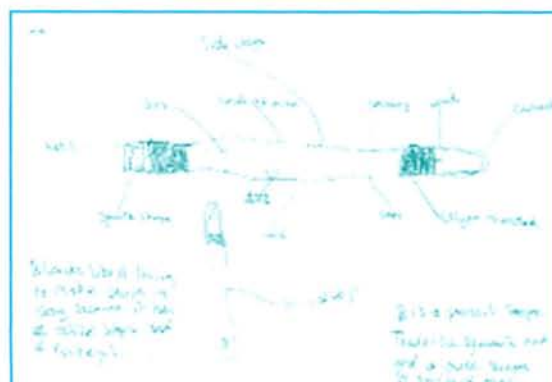


Figure 7: Alice's annotated drawing of the modelling tool.

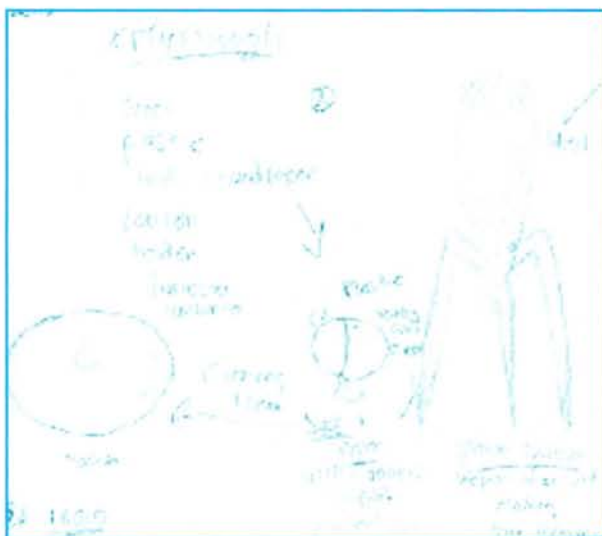


Figure 8: Bryony's sketches of the mystery items.

report back to the whole class. As a teacher she favours providing children with a variety of different contexts for learning and this type of product focused activity enabled children to use their senses, to apply logic and to problem solve – all skills being developed elsewhere, but being further enriched through the use of handling collections.

The secondary teacher

This second case study outlines how the Mystery Loan Box was used with Year 10 pupils in a girls' secondary high school. It shows how the Loan Box was used to enhance product analysis activities and how this teacher also extended the opportunities provided by creating further handling collections. To prepare the case study, a semi structured interview was conducted with the teacher and four of the pupils who had engaged in the work: Kate, Catherine, Rachel and Bryony.

How the handling collection was used

The Mystery Box was used within a fairly long unit of work on product analysis. The teacher had identified a need to develop skills in this area and utilised the Mystery Box to enrich the learning experience she was planning. The overall project was spread over 10 weeks. It came after a Key Stage 4 introductory project on designing and

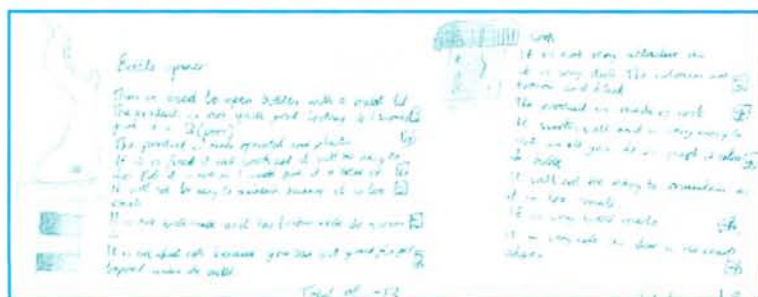


Figure 9: Analysing bottle stoppers.

modelling mobile phones and in advance of a project on designing and making CD cases.

The thrust of the product analysis unit of work was to develop pupils' skills in observing and analysing the design features of products and involved a series of linked activities. The first of these was a 'warm up' activity in which the girls swapped school bags and undertook an analysis of these, using a series of headings provided by the teacher. This was followed by the teacher using the Mystery Box: first exploring all the products in the box and second taking one item from the Box and creating a new handling collection of products with the same purpose as this item.

For the first activity the pupils worked in groups. They were asked to explore each of the items in the Box, brainstorming everything they considered the product could be used for, however 'wacky' the idea might be. The teacher was keen that the pupils used this activity to have some 'fun' with ideas and to free up their thinking. The girls were encouraged to let their minds explore ideas however extreme they might seem. Group work was used to help expand their thoughts as they analysed and discussed possibilities. They made a sketch of each product and highlighted what they thought the function of the product was. The pupils were encouraged to think laterally – as can be seen from Bryony's suggestions of 'paper weight' and 'hamster umbrella' for what turned out to be the Alessi cruet!

For the second activity the teacher created an extension to the handling collection, by taking the Starck juicer from the Box and making a collection of products designed to fulfil the same purpose. She was keen that the girls would be able to put the products to the test, so provided them with oranges so that they could drink their results! By comparing and analysing similar products, evaluation skills were also developed. Next, the teacher progressed this approach by moving from juicers to bottle openers, corkscrews and bottle stoppers, making a small collection of each of the three types of products. The girls could now apply and further hone the analytical and evaluative skills developed to date.

The teacher then moved the pupils on to a further handling collection she had made, this time of electric kettles. This collection started with a 40 year-old kettle that still functions and included others that spanned developments that have taken place over the years, including the introduction of plastics, 'jug' kettles and the recent move to cordless kettles. Each girl made a detailed analysis of the kettles, including using sketching

techniques to explore specific features such as spouts and handles.

All of the above analysis activities were undertaken in lesson time, guided by the teacher who progressively supported pupils in the development of their skills. The final analysis was conducted as homework. For this, each girl analysed her own personal stereo – all girls having access to one of the many models on the market. The outcomes from this task were quite remarkable when compared to the work produced at the start of the unit. Early work was generally competent, but lacked depth and detail. The final analysis enabled the girls to show their newly developed skills and understanding – in the case of Catherine, producing an analysis that covered four A3 sheets and 20 different headings.

The pupils' and teacher's reflections on the activities

The girls showed a great deal of enthusiasm for the work they had completed. The Mystery Box had been a source of delight, inspiration and fun and had clearly enhanced the whole unit of work. The key to its success was in the fact that they didn't know what each item's function was, so had to look carefully at the detailed features of each product to establish the function. This helped them to develop skills in observation, learning the importance of attention to detail. They highlighted the importance of having the actual products in front of them because of the direct, hands on exploration this afforded. They also welcomed the group work approach, as it allowed them to share and bounce ideas off each other. One girl commented on how she enjoyed being able to use her own initiative as the teacher, having given some initial guidance, left them to decide how they would approach, record and present their work.

All were conscious of the progression in their work and the impact on their ability to write specifications. They felt they were able to bring a greater degree of detail and precision to this than in previous projects. While they were not all sure that they would always include such a high level of detail, they felt a quick reminder about the project would bring to the fore what they had learnt.

The teacher's main aim in using the Loan Box was to increase the skills in product analysis and she felt this had definitely been achieved. The Design Museum resource had been a great help: the initial training session had given her the confidence to handle product analysis in this way; the actual products being so stimulating to explore. The quality of the work that was produced was better than in



Figure 10: A collection of kettles.

previous years: the teacher felt that everything about the Box enhanced the teaching and learning that had taken place.

Using the Mystery Box in a special school

The final case study outlines how the Mystery Loan Box was used by teachers in an MLD Special School. The design and technology co-ordinator attended an INSET session within her LEA that was presented by the LEA Advisory Teacher for design and technology. She subsequently borrowed the Box and used it with a Year 10 class. She shared her experiences with a colleague who used the resource with a Year 7 class. The case study looks generally at the issues of using handling collections in special education and more particularly at the activity where the Box was used with Year 7.

How the handling collection was used

For the INSET session, the LEA Advisory Teacher had prepared two guidance sheets. The first was a set of questions that was based on suggestions made by the Design Museum trainer. The headings for this first sheet were *Design, Materials, Use and Production*. The second sheet was a supplementary set of questions prepared within the LEA under the headings *Form, Construction, Function and Context*. Taken together, the two lists provide a very detailed set of prompts to support product analysis and the Year 7 teacher used these as a basis for drawing up her own framework for the children to work with. The teacher found these two sheets extremely valuable as she hadn't attended the INSET session and hadn't had the first hand experience of exploring the objects that the co-ordinator had. The framework she developed was in grid format and presented the learners with a slightly modified set of questions, grouped together where

Figure 11: Questions used.

LOOKING AT OBJECTS	
FORUM	FUNCTION
1. What does it look and feel like?	14. What does it do?
2. What do you like about the way it looks/feels?	15. What does the object intend to do?
3. What is it made of?	16. How does the object work?
4. Does it remind you of anything else?	17. Does it need to have any special properties?
5. Was it ever changed, adapted, needed?	18. What else could you use it for?
6. Has anything else made you think what language it is?	19. How does it do what it does?
	20. Does it do it well?
	21. How might it go wrong or be lost/damaged?

appropriate, with space beside each for notes to be made during their observation and exploration.

The activity began with the objects covered with a cloth. The pupils worked in pairs, each starting with one object, which they explored using the questions on the grid as prompts. The objects were swapped around until each pair had been able to explore three different items. The items were then returned to the pair they started with, who used their notes to prepare a short presentation to the rest of the group about their product. As two other pairs had also reviewed the item, they too were enabled to make an informed contribution.

For these learners, developing literacy skills is particularly important and the teacher built in opportunities to develop literacy skills wherever possible. This activity provided excellent opportunities to develop vocabulary. She also saw the activity as being ideal at developing skills and confidence in oral speaking and it was for this reason that she included the presentations.

The teacher found the activity to be very stimulating for the pupils, particularly because of the unusual nature of the Mystery Objects. The activity promoted a great deal of interest and discussion as the learners explored the materials used and considered the function of each object and who would use it. She found it to be very valuable in developing design awareness and the vocabulary linked to product analysis in a way that is not usually possible with the regular designing and making the pupils undertake, the nature of their learning difficulties generally constraining the range of practical skills and construction that is possible. In particular the Mystery Objects presented a valuable experience to explore materials that they wouldn't typically use. The approach that the teacher took with this activity is similar to one she uses with the pupils in history activities where they also use handling collections. This provided an additional benefit in that she could build on skills and understandings

developed elsewhere in the learners' experience.

Developments since using the Mystery Loan Box

Since using the Mystery Box, the design and technology coordinator has found herself considering the way in which she encourages the learners to consider the products they are interacting with in design and technology lessons. To this end she has found herself making more use of the product analysis approach during regular design and technology lessons, where she provides a range of different models of tools and equipment for practical work. In this way the learners will look at a range of different vegetable peelers while they are engaged in an activity requiring them to peel vegetables, each child having a different peeler. She encourages them to consider how a particular tool works and why it does or doesn't do its job well. She has a range of electric kettles in the food room, so when these are being used she encourages the learners to find out which one boils more quickly and so on. She takes a similar approach to encouraging the comparison of food products. As some of the tools available are quite old she is able to encourage the pupils to consider how products have changed – or not! This historical dimension is one she is beginning to utilise in building up handling collections for use across the school.

Concluding comments on the case studies

In the first case study the positive long term effect of the Outreach Programme can be seen. The teacher's enthusiasm was fired by the training session and then through classroom experience she further developed and honed the ideas presented into a valuable teaching and learning experience, embedded in her practice. The case study vividly illustrates the potential for using such activities with the youngest children in our classes. The perseverance and quality of work demonstrated by the reception children serve as a clear exemplar of what is possible, given

a rich stimulus and carefully structured and managed activity. In addition it serves as a cogent reminder of the power of working with quite simple, everyday objects, which may not provide the fascination or provoke the imagination of the Design Museum's collection, but which can still effectively develop children's understanding of the designed world that surrounds them.

This long term impact of the Design Museum's Outreach work is also illustrated in the secondary case study. It shows the effective way in which working with handling collections in a well structured manner can raise standards in teaching and learning. It is worth noting that the Mystery Box was used by a teacher who already made use of handling collections but that she still gained further confidence and understanding by having the opportunity to use the Design Museum's Collection, which clearly has potential in the hands of both novice and experienced teachers. The case study illustrates how the Collection can be used on its own or incorporated into other work, both through the example of the extension collection around the Starck lemon juicer and through the progressive way in which the teacher used the different collections to develop the pupils' skills.

The final case study shows the value of using stimulating handling collections with children who have special educational needs. The Mystery Box itself has provided a rich and stimulating resource that has enabled the learners to broaden their experience and their design awareness that is less possible in their regular design and technology lessons which, because of the pupils' special learning needs, tends to have a more pragmatic approach. But of additional importance is the approach to product analysis that can be applied to the artefacts that they do encounter on a regular basis. This has become an important strategy within the teaching and learning in the school in question.

Taken together, the case studies illustrate the opportunities provided by the Design Museum resource and how these have been extended and developed by teachers into a wealth of exciting and valuable learning and teaching experiences.

Notes

1. Sponsorship for the project was provided by Marks and Spencer PLC
2. The full report of the evaluation, *Design Museum National Outreach Project: Evaluation Report* by Kay Stables is published by Goldsmiths College, University of London. For further information, please contact the author: k.stables@gold.ac.uk